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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/726,334	12/01/2003	Andreas H. von Flotow	367618016US1	5497

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EXAMINER	
JONES, HEATHER RAE	
ART UNIT	**PAPER NUMBER**
2621	

NOTIFICATION DATE	DELIVERY MODE
03/03/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/726,334	VON FLOTOW ET AL.	
	Examiner	Art Unit	
	HEATHER R. JONES	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 November 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,6-18 and 27-45* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *1-3,6-18,35-40,44 and 45* is/are allowed.

6)☒ Claim(s) *27-34 and 41* is/are rejected.

7)☒ Claim(s) *42 and 43* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/20/2009*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed November 20, 2009 regarding claims 27-34 and 41 have been fully considered but they are not persuasive.

The Applicant argues that Riconda et al. in view of Bosson et al. fails to disclose “a new line-of-sight adjustment rate derived from the change in location of an object within images" as well as “adjusting a scan rate of the line-of-sight controller based on the scan angle; and adjusting a tilt rate of the line-of-sight controller based on the tilt angle”. The Examiner respectfully disagrees. Riconda et al. discloses in paragraph [0133] the technique of using multiple images to calculate the change in location of the object within the images. Furthermore, paragraph [0136] describes how the information determined from the previous method of locating the object in multiple images and calculating the changes along with other variables are used to determine the change in position in physical space which is then converted to the angular offsets to the rotational transducers on the robotic camera mount, t thereby changing the camera's line-of-sight with respect to scanning and tilting. Therefore, Riconda meets the claimed limitations and the rejection is maintained.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 27-34 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Riconda et al. (U.S. Patent Application Publication 2002/0130953) in view of Basson et al. (U.S. Patent 7,474,335).

Regarding claim **27**, Riconda et al. discloses an apparatus for stabilizing imagery from a moving video camera displayed on a display device, comprising: a mechanical line-of-sight controller for controlling line of sight of the video camera at a specified line-of-sight adjustment rate (Figs. 2A, 2B, 18A and 18B; paragraphs [0130]-[0136]); and an electronic stabilization component that provides frame-to-frame image stabilization based on a location of an object within the images and that provides to the mechanical line-of-sight controller a new line-of-sight adjustment rate derived from the change in location of an object within the images to account of large-amplitude jitter (Figs. 18A and 18B; paragraphs [0130]-[0136]). However, Riconda et al. fails to disclose adjusting the display of the image based on the inter-frame stabilization adjustment to remove small-amplitude jitter.

Referring to the Basson et al. reference, Basson et al. discloses a method for stabilizing an image of an object being taken from a video camera, the video camera being moved by a transport mechanism (col. 1, lines 66 – col. 2, line 3), the method comprising: using the inter-frame stabilization adjustment for adjusting the position of a displayed area of an image, and adjusting the position

of a displayed area of the image based on the inter-frame stabilization adjustment, thereby adjusting the display of the image based on the inter-frame stabilization adjustment to remove small-amplitude jitter (col. 3, line 40 – col. 4, line 25 and col. 4, lines 41-55 – the image displayed is the image that "should" be displayed as in the image that is displayed accommodates for the movement of the object and movement of the camera).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have adjusted the display according to the inter-frame stabilization adjustment as calculated by Basson et al. in the method disclosed by Riconda et al. in order to allow the user to easily view the image on the transport mechanism.

Regarding claim **28**, Riconda et al. in view of Basson et al. discloses all the limitations as previously discussed with respect to claim 20 including that the amount of frame-to- frame image stabilization is additionally based on velocity and orientation of an airborne transport vehicle, orientation of the video camera relative to the airborne transport vehicle, and distance from the video camera to an object within the image (Riconda et al.: paragraph [0131]; Basson et al.: col. 3, line 40 – col. 4, line 25 and col. 4, lines 41-55).

Regarding claim **29**, Riconda et al. in view of Basson et al. discloses all the limitations as previously discussed with respect to claim 27 including that an amount of frame-to-frame image stabilization is additional based on the specified

line-of-sight adjustment rate (Riconda et al: Figs. 18A and 18B; paragraphs [0130]-[0136]).

Regarding claim **30**, Riconda et al. in view of Basson et al. discloses all the limitations as previously discussed with respect to claim 20 including that the line-of-sight adjustment rate includes a scan rate and a tilt rate (Riconda et al.: paragraph [0131] - the positions of the angular transducers effecting the attitudinal control of the robotic camera mounting, which would include the scan and tilt rates that create the angular position of the camera).

Regarding claim **31**, Riconda et al. in view of Basson et al. discloses all the limitations as previously discussed with respect to claim 20 including that an image received from the video camera is larger than a displayed image and the electronic stabilization component provides frame-to-frame image stabilization by adjusting the location of the displayed image within a received image (Riconda et al.: paragraph [0023] – it is well known in the art that when the user zooms in on the target the image would need to be adjusted accordingly to display).

Regarding claim **32**, Riconda et al. in view of Basson et al. discloses all the limitations as previously discussed with respect to claim 20 including that the specified line-of-sight adjustment rate includes a user-specified image flow (Riconda et al.: Figs. 18A and 18B; paragraphs [0130]-[0136] – the user can determine the area of interest, which object to track).

Regarding claim **33**, Riconda et al. in view of Basson et al. discloses all the limitations as previously discussed with respect to claim 20 including that the

mechanical line-of-sight controller is a motorized gimbal system (Riconda et al.: Figs. 2A and 2B).

Regarding claim **34**, Riconda et al. in view of Basson et al. discloses all the limitations as previously discussed with respect to claim 20 including that the frame-to-frame adjustment keeps an object of the images at the same location when displayed (Riconda et al.: Figs. 18A and 18B; paragraphs [0130]-[0136] – camera is updated with new parameters in order to keep the target in the center of the display).

Regarding claim **41**, Riconda et al. discloses a method in a camera stabilization system for stabilizing the display of images received from a video camera attached to an aircraft and controlled by a gimbal-based line-of-sight controller (Figs. 2A and 2B), the method comprising: receiving a first image from the video camera; receiving a second image from the video camera; determining the position of an object in the first image; determining the position of the object in the second image; determining an image pixel offset in the scan direction, IPO(S), based on the difference in the position of the object in the first and second images; determining an image pixel offset in the tilt direction, IPO(T), based on the difference in the position of the object in the first and second images; determining a pixel offset in the scan direction, PO(S), based on IPO(S); determining a pixel offset in the tilt direction, PO(T), based on IPO(T); converting PO(S) to a corresponding scan angle based on the field of view of the video camera; converting PO(T) to a corresponding tilt angle based on the field of view

of the video camera; adjusting a scan rate of the line-of-sight controller based on the scan angle; and adjusting a tilt rate of the line-of-sight controller based on the tilt angle so that both the display of the image and the line of sight controller are adjusted based on IPO(S) and IPO(T) (Figs. 18A and 18B; paragraphs [0130]-[0136] – in order to determine the difference between two images the object would be compared to the previous image in both the scan and tilt directions and since pictures are being compared one way to measure them are according to pixels which would be finest detail to better accurately determine the distance). However, Riconda et al. fails to disclose adjusting the display of an image on a display device of the camera stabilization system based on PO(S) and PO(T) so that both the display of the image and the line of sight controller are adjusted to based on the IPO(S) and IPO(T).

Referring to the Basson et al. reference, Basson et al. discloses a method for stabilizing an image of an object being taken from a video camera, the video camera being moved by a transport mechanism (col. 1, lines 66 – col. 2, line 3), the method comprising: using the inter-frame stabilization adjustment for adjusting the position of a displayed area of an image, and adjusting the position of a displayed area of the image based on the inter-frame stabilization adjustment, thereby adjusting the display of an image on a display device of the camera stabilization system based on scan and tilt directions (col. 3, line 40 – col. 4, line 25 and col. 4, lines 41-55 – the image displayed is the image that

"should" be displayed as in the image that is displayed accommodates for the movement of the object and movement of the camera).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have adjusted the display according to the inter-frame stabilization adjustment as calculated by Basson et al. in the method disclosed by Riconda et al. in order to allow the user to easily view the image on the transport mechanism.

Allowable Subject Matter

4. Claims 42 and 43 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

5. The following is a statement of reasons for the indication of allowable subject matter: Prior art fails to teach or fairly suggest a method in a camera stabilization system for stabilizing the display of images received from a video camera attached to an aircraft and controlled by a gimbal-based line-of-sight controller, the method further comprising:

a. determining aircraft pixel offsets caused by the movement of the aircraft by, receiving an indication of the velocity of the aircraft in the earth reference frame, $V^{E}_{aircraft}$, receiving a matrix, C_{BE}, corresponding to the orientation of the aircraft in the earth reference frame, receiving a matrix, C_{CB}, corresponding to the orientation of the camera, calculating a transformation matrix, C_{CE}, for

transforming form the earth reference frame to the camera reference frame, wherein $C_{CE}=C_{CB}C_{BE}$, calculating a line of sight, L^E, of the camera in the earth reference frame, wherein $L^E = C_{CE}{}^T(1,0,0)^T$, determining the distance, K, to an object at the center of the image, determining the velocity of the aircraft in the camera reference frame, $V^c_{aircraft}$, wherein $V^c_{aircraft} = C_{CE} * V^E_{aircraft}$, calculating a normalized velocity of the aircraft $V^c_{aircraft} = V^c_{aircraft}/K$, calculating a first difference in scan units $\Delta S_1{}^C$, wherein $\Delta S_1{}^C = V^c_{aircraft}(S)* \Delta T$, wherein $V^c_{aircraft}(S)$ corresponds to the normalized velocity of the aircraft in the scan direction, and wherein ΔT corresponds to a frame refresh period, calculating a first difference in tilt units $\Delta T_1{}^C$, wherein $\Delta T_1{}^C = V^c_{aircraft}(T)* \Delta T$, wherein $V^c_{aircraft}(T)$ corresponds to the normalized velocity of the aircraft in the tilt direction, calculating an aircraft pixel offset in the scan direction APO(S), wherein $APO(S)= \Delta S_1{}^C * P/Z$, wherein P corresponds to a pixel density associated with the camera, and wherein Z corresponds to a zoom factor associated with the camera, calculating an aircraft pixel offset in the tilt direction APO(T), wherein $APO(T)= \Delta T_1{}^C * P/Z$, wherein PO(S) is determined based on IPO(S) and APO(S), and wherein PO(T) is determined based on IPO(T) and APO(T) (claim 42, claim 43 depends from claim 42).

6. Claims 1-3, 6-18, 35-40, 44 and 45 are allowed.

7. The following is an examiner's statement of reasons for allowance: Prior art fails to teach or fairly suggest a method for stabilizing an image of an object being taken from a video camera, the video camera being moved by a transport mechanism and

being controlled by a line-of-sight controller, the line-of-sight controller having an orientation and an angular velocity, the method comprising:

a. Controlling the line-of-sight controller at least in part by, calculating a line-of-sight adjustment for the line-of-sight controller based on the inter-frame stabilization adjustment, adjusting the orientation of the line-of-sight controller based on the calculated line-of-sight adjustment, calculating an angular velocity for the line-of-sight controller based on the inter-frame stabilization adjustment, and setting the angular velocity of the line-of-sight controller to the calculated angular velocity (independent claim 1, claims 2, 3, 6-12, and 44 depend from claim 1).

b. Controlling the line-of-sight controller by, calculating a line-of-sight adjustment for the line-of-sight controller based at least in part on the determined difference, adjusting the orientation of the line-of-sight controller based on the calculated line-of-sight adjustment to account for large-amplitude jitter, calculating a pan rate for the line-of-sight controller based at least in part on the determined difference, and setting the pan rate of the line-of-sight controller to the calculated pan rate (independent claim 13, claims 14-18 and 45 depend from claim 13).

c. Controlling the line-of-sight controller at least in part by, calculating a line-of-sight adjustment for the line-of-sight controller based on the inter-frame stabilization adjustments, adjusting the orientation of the line-of-sight controller in accordance with the calculated line-of-sight adjustment, calculating a rate of

rotation for the line-of-sight controller based on the inter-frame stabilization adjustments, and setting the rate of rotation of the line-of-sight controller to the calculated rate of rotation (independent claim 35, claims 35-40 depend from claim 35).

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HEATHER R. JONES whose telephone number is (571)272-7368. The examiner can normally be reached on Mon. - Thurs.: 7:00 am - 4:30 pm, and every other Fri.: 7:00 am - 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thai Tran can be reached on 571-272-7382. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Heather R Jones
Examiner
Art Unit 2621

HRJ
February 26, 2010

/Thai Tran/
Supervisory Patent Examiner, Art Unit 2621